

# Summaries

UDC 553.411.071:552.322

**Kucherenko I.V.**  
**DIORITES AS AN INTERMEDIATE IN GOLD-PRODUCING**  
**FLUID-MAGMATIC GRANITE-DOLERITIC COMPLEXES**

The conditions of developing gold-producing fluid-magmatic granite-doleritic complexes have been considered by the example the Kedrovskoye deposit of the North Transbaikalia. The part of average igneous rock in its composition is shown and discussed, they underlying the evolutionary change of early ultrametamorphic granodiorites and quartz diorites of heart-domic construction by moderately alkali quartz dioritic porphyrites and then – accompanied by rock-formation by alkali basaltoids in dyke faces in generalized magmatic antidromic scheme. The presence of dioritoids in other mesothermal gold deposits is supposed to demonstrate the prevalence of evolution transition phenomenon from early to later magmatites of the fluid-magmatic complexes involved and explain the reasons for further investigation.

UDC 553.311

**Voroshilov V.G.**  
**GEOCHEMICAL ZONALITY OF SKARN-GOLD DEPOSITES**  
**OF THE WESTERN SIBERIA. PART 1.**

Geochemical zonality of gold-skarn deposits of the Western Siberia has been investigated. Concentrically zone construction of geochemical field anomalous structure accompanying the deposits involved is revealed. The groups of concentrating and deconcentrating (with respect to golden-ore bodies) elements are determined. The close spatial connection between gold and complex of chalcophile satellite elements is stated. Their composition can change depending on the evolution degree of hydrothermal system. The composition of deconcentrating elements accumulated at the periphery of ore bodies is standard in general and includes Ni, Co, Cr, V, Ba, Mn. In the first part of the paper the geochemical deposit zonality of Sinychinskiy type is considered, the second part is devoted to zonality of Kazsk ore field and discussion of the results.

UDC 553.46:550.42:546(571.15)

**Potseluev A.A., Babkin D.I., Talibova A.G.**  
**ISOTOPE COMPOSITION OF GREISEN HYDROGEN**  
**DEPOSITS (KALGUTINSK DEPOSIT)**

Isotope composition of graphite hydrogen in the main industrial vein and near-vein greisens of Kalgutinsk rare-metal deposit Mountainous Altai has been studied. Formation of graphite is connected with hydrogen release in the process of partial oxidation of initially reduced ore-forming metal-bearing fluid. The content of  $C_{org}$  in vein is 0,036 %, in greisens it is 0,022 %. Hydrogen is characterized by "light" isotope composition,  $\delta^{13}C_{org}$  in vein is 23,9, in greisens it is 25,3 ‰. The "weighting" of the element up the vein is revealed, it being explained by fluid evolution. Regular isotope fractioning in vein – near-vein greisen system is stated. Isotope fractioning is different in the areas of vein in thickness and content of ore components. The conclusion about homogeneity and depth nature of hydrogen is made.

UDC 552.5:551.862.1

**Osipova E.N., Yezhova A.V., Nedolivko N.M.,**  
**Perevertailo T.G., Polumogina E.D.**  
**LITHOLOGIC-PETROGRAPHIC PECULIARITIES**  
**AND CONDITIONS OF REGIONAL CYCLITE ROCK**  
**FORMATION  $J_{15}$ , UNCOVERED BY PARAMETRIC BORE**  
**OF THE 1<sup>st</sup> WESTERN-TYMSK AREA**

Lithologic-petrographic research has shown that formation of regional cyclite rock  $J_{15}$ , uncovered by parametric bore of the first Western-Tymsk area (Tomsk region) occurred during two alternate transgressive cycles, peculiarities of which are presented in the lithological composition of lower and upper zone cyclites. Inclusions of glauconite and chlorite, organic exuvia, various stratification, wash-out and redeposition

traces of lower sediments indicates the formation of radiated stratum in shallow marine basin with active hydrodynamic conditions.

UDC 552.578

**Abrosimova O.O., Kulagin S.I.**  
**PREDICTION OF DEPOSIT OIL-BEARING CAPACITY**  
**OF THE TUTLEYM SERIES WITHIN THE KRASNOLENINSK**  
**ARC (WESTERN SIBERIA)**

The paper is devoted to the problem of mapping fractured and cavernous fractured reservoirs of the Tutley series within the Krasnoleninsk arc. It is shown that the most perspective deposits are those of the Low-Tutley arc. The presence of relation between reservoir and acoustic properties of the rocks involved is stated. For reservoirs to be mapped the results of dynamic inversion of time sections are used.

UDC 550.42:57.4(571.1)

**Savichev O.G.**  
**THE HYDROCHEMICAL RUNOFF**  
**OF THE MIDDLE OB RIVER BASIN**

The results of researching a hydrochemical drain in pool of Middle Ob and the conditions of its formation are presented. Average values of carrying out the main ions, microcells, organic and biogenic substances with waters of the rivers Ob, Tom, Chulym, Ket, Tym, Vasugan, Parabel, Chaja within 1970–2000 are established. The basic part of a hydrochemical runoff in Ob river basin is shown to be presented by macrocomponents and difficultly oxidized organic substances and to be formed as a result of action of mainly natural factors. Anthropogenous transformation of hydrochemical runoff of the last decades manifests itself as an increase in carrying out hydrocarbons, nitrogen compounds and some other substances, microorganisms.

UDC 550.42:577.4(571.1)

**Mishchenko M.V.**  
**THERMAL WATER RESOURCES**  
**OF KOLPASHEVO AREA IN TOMSK REGION**

The possibility of using thermal underground water for thermal-power purposes is shown. The resources of Apt-alb-Senoman, Gote-riv-Barrem and Valazhin water-bearing complexes are estimated. The analysis of possible scale in borehole is carried out. Thermal resources of the underground water are calculated.

UDC 514.752

**Onishchik N.M., Narezheva D.I.**  
**VECTOR FIELDS OF ZERO TOTAL CURVATURE**  
**OF THE SECOND TYPE IN FORE-DIMENSION SPACE**

The geometry of flat vector field for which total curvature of the second type is equal to zero in some G region области of fore-dimensional Euclidean  $E_4$  space has been studied. Complete classification of such vector fields depending on the rank of basic linear operator is presented. Geometrical curvature properties of non-holonomic Pfaffian variety orthogonal to vector field are investigated for each class. The example of vector field (in general) having constant, not equal to zero vector of nonholonomicity is constructed. The research is carried out by means of the method of Cartan exterior form using moving frame.

UDC 330.43

**Belsner O.A., Kritskiy O.L.**  
**APPLICATION OF ONE-DIMENSION STS-DISTRIBUTION**  
**FOR MODELLING MAGNITUDES OF STOCK INDEXES**

Modified method STS-GARCH(1,1) has been considered. Modification consisted in rejection of the statement on normal low of logarithm distribution of time series day increment and in their application

for the description of Smoothly Truncated  $\alpha$ -Stable (STS)-distribution (smoothly abridged  $\alpha$ -stable). The method parameters were found by the technique of maximum likelihood. Statistic investigation of the suggested algorithm accuracy was carried out and decrease of autocorrelation in data structure used for the analysis was shown.

UDC 658.512.2.012.122

**Borovikov I.F., Fisochenko E.G.**  
**QUADRATIC FLAT INVOLUTIONS AS A BASIC METHOD**  
**OF OBTAINING CURVES IN THE SYSTEMS OF CAE**

The way of setting up non-central quadratic flat involutions, based on application of pencils of circles is suggested, transformation operators are introduced, the examples of rational circular curves constructed by this method are given.

UDC 629.11.012(075.8)

**Posmetiev V.I., Tarasov E.A., Snyatkov E.V., Latysheva M.A.**  
**ARGUMENTS FOR EQUIPPING DT-75M TRACTOR**  
**CARRIAGE WITH RECUPERATIVE ELEMENTS**  
**BY MEANS OF MATHEMATICAL SIMULATION**

By means of simulation dynamic model of a forest tillage machine the possibility of equipping DT-75M tractor carriage with recuperative elements has been studied. In this case energy extraction in each carriage does not worsen vibration spectrum of tractor case up to 0,7 kW.

UDC 539.3

**Ukrainets V.N.**  
**COJOINT EFFECT OF MOBILE NORMAL AND TORQUE**  
**LOADS ON TUNNEL WITH CIRCULAR SUPPORT**

The problem solution on influence of mobile normal and torque loads on an infinitely long cylindrical shell in elastic inertial half-space has been obtained. The load functions are supposed to be developed in Fourier series by angular coordinate and Fourier integral by axial coordinate. The movement of shell is described by classical equation of thin shell theory, but elastic half-space is done by elasticity theory dynamic equations in Lamé potentials that are solved by means of Fourier integral transformation method. The problem is a model for rock mass deflected mode calculation under inequality of dynamic loads transferred to each of rails in a cylindrical tunnel or under treatment facility's rotary motion in an underground pipework.

UDC 624(007.2:57.085)

**Yuriev A.G., Kluev S.V., Kluev A.V.**  
**OPTIMIZATION OF BUILDING CONSTRUCTIONS**  
**ON THE BASIS OF GENETIC ALGORITHM**

The technique of optimal design of bearing structures on the basis of genetic algorithm has been suggested. A design of steel frame at varying 9 parameters using the method of finite elements is considered as an example. The best variant corresponding to the volume minimum of the frame material is revealed.

UDC 537.333

**Grigoriev V.P., Ofitserov V.V., Semeshov V.A.**  
**SIMULATION OF INJECTION AND CAPTURE**  
**OF BEAM ELECTRONS IN SMALL-SIZE BETATRONS**  
**BY THE METHOD OF MACROPARTICLES**

The simulation problem of self-consistent dynamics of electron beam in small-size betatrons has been considered. The description of numerical model developed on the basis of macroparticle method is presented. The results of process modelling of electron injection and capture on the acceleration mode in betatrons with axially-symmetrical and asymmetrical magnetic field are shown. Optimal input injection parameters by beam current and energy (20...40 keV and 0,1...1,0 A) providing the maximum number of the capture electrons are defined. The techniques of increasing capture efficiency due to using variations of external magnetic field and additional energy selection of circuital decelerating EMF of the captured electrons are numerically studied. It allows an increase in capture coefficient from 4 to 7,4 % and capture at the acceleration up to  $7,4 \cdot 10^{10}$  electrons.

UDC 621.364.634.3

**Moskalev V.A.**  
**IRON-FREE ELECTRON SYNCHROTRON**  
**WITH WEAK FOCUSING**

A synchrotron construction the magnetic field of which is without steel core is suggested. Acceleration chamber is combined with magnetizing winding. The described version of accelerator is favorably different in small weight, simplified production and assembling technique.

UDC 621.384.647

**Pushkarev A.I., Sazonov R.V.**  
**INVESTIGATION OF CHARGE BALANCE IN DIODE UNIT**  
**OF PULSE ELECTRON ACCELERATOR**

The results of experimental investigation of charge balance in the diode unit of high-current pulse electron accelerator TEU-500 (350...500 keV, 60 ns, 250 J in impulse) at the operation in the mode of electron beam generation are presented. The research is performed for planar diode with cathodes of 43...60 mm in diameter, made of graphite, copper, and carbon fibre with multi-edge cathode. It is shown that the main source of parasite electron losses in planar diode is their scattering in the anode-cathode gap induced by field distortion at the cathode periphery. Under the condition of diode impedance matching to output resistance of nanosecond generator (the gap of 10...12 mm) the charge losses value does not exceed 12 %. The value of electron scattering half-angle is 68° at small anode-cathode gaps and decreases with increasing the gap up to 60°.

UDC 621.039.51(075.8)

**Kuzmin A.V.**  
**ANALYTICAL SOLUTION OF CRITICAL PROBLEM FOR SLAB**  
**HOMOGENEOUS REACTOR WITH INTERNAL REFLECTOR**

Analytical estimation of central reflector influence by the example of slab reactor in one-group and diffusive-age approximations has been carried out. On the side of external reflector an effective border is introduced which simplifies the mathematical statement of critical problem. Approximation of the solution is performed for one of the states of the researched reactor IPT-T.

UDC 621.391

**Voskoboinikov Yu.E., Isayev Yu.N.,**  
**Litasov V.A., Kolchanova V.A., Kuleshova E.O.**  
**REGULARISING ALGORITHM OF PARAMETER**  
**IDENTIFICATION OF ELECTRIC**  
**CHARGE EQUIVALENT CIRCUIT. PART I.**

A new algorithm of parameter identification of equivalent circuit for electrical charge replacement is suggested. The approach is based on the solution of integral equation of the I type with respect to the function of indicial admittance, by which then determination of replacement circuit parameters is carried out. Application of smoothing splines and original regulating algorithm including kernel setting error of integration equation permits to obtain a stable algorithm of parameter identification. The investigation of algorithm shows high calculating efficiency and sufficient accuracy of parameter identification.

UDC 621.315.592

**Parashchik V.V., Rusakov K.I., Dzhabbarov R.B.**  
**OPTIMIZATION OF LIMITING MODES**  
**OF STREAMER SEMICONDUCTOR LASER**

The influence of intensive electric and optical fields produced by streamer discharge in wide-gap semiconductor on their spectroscopic properties has been studied. The given effect is developed at appearance of reversed reconstruction of active environment luminescent characteristics. The methods of sufficient increase in durability and efficiency of streamer laser at limiting modes based on application of semiconductor protecting layers of a definite crystallographic orientation and crystal microrelief with element size of light wave length order. Streamer luminescence in new perspective  $\text{CaGa}_2\text{S}_4\text{:Eu}$ ,  $\text{Ca}_4\text{Ga}_2\text{S}_7\text{:Eu}$  compounds is found and studied.

UDC 537.521.7

**Gefle O.S., Lebedev S.M., Pokholkov Y.P.**  
**COMPLEX PERMITTIVITY FREQUENCY SPECTRA**  
**OF COMPOSITE DIELECTRICS ON THE BASIS**  
**OF POLYVINYLCHLORIDE**

Complex permittivity frequency spectra of polymeric composite materials on the basis of plasticized polyvinylchloride filled with powders of ferroelectric ceramics PZT and titanium dioxide have been studied in this work. It is shown that it is possible to design a new composite material with high stored energy on the basis of polyvinylchloride matrix.

UDC 539.2

**Bukrina N.V., Knyazeva A.G.**  
**SIMULATION OF FORMING DIFFUSION ZONE AT IMPULSE**  
**ELECTRON-BEAM TREATMENT OF COATED MATERIAL**

Model of forming diffusion zone between material and coating during the process of impulse electron-beam treatment has been formulated. Algorithm of numerical problem solution on non-isothermal diffusion is developed taking into consideration the difference of spatial and temporal scales of heat conductivity and diffusion in solid substances. Dependence of diffusion zone characteristics on radiation treatment conditions is studied.

UDC 537.533

**Dyskin V.G.**  
**OPTIMIZATION OF TRANSMISSION FACTOR**  
**OF HEAT-REFLECTIVE COATING**

The results of computer optimization of visual transmission factor  $T_v$  of the heat-reflective coating  $\text{SnO}_2$ -Ag-SnO<sub>2</sub> и  $\text{TiO}_2$ -Ag-TiO<sub>2</sub> with protective layers are presented. It is stated that for the condition  $T_v \geq 80\%$  to be fulfilled the thickness of protective silver layers for  $\text{SnO}_2$ -Ag-SnO<sub>2</sub> should not exceed 1,5 nm, but for  $\text{TiO}_2$ -Ag-TiO<sub>2</sub> it is 2 nm. Heat reflective coatings with one protective layer are shown to possess better optical characteristics in comparison with two protective layers.

UDC 541.16:182

**Ilyin M.A., Vereshchagin V.I., Tikhonov D.V., Nazarenko O.B.**  
**INCREASING FLOW RESISTANCE OF HIGH-PRESSURE**  
**POLYETHYLENE MODIFIED BY ULTRAFINE POWDERS**

The affect of small additions ( $\leq 1$  wt. %) of ultrafine fillers AlN и  $\text{Al}_2\text{O}_3$  on flow resistance of high-pressure polyethylene has been investigated. The most increase of flow resistance is obtained for polyethylene samples produced at low cooling rate filled with AlN (0,075 wt %).

UDC 541.16.182

**Godymchuk A.Yu., Ilyin A.P., Astankova A.P.**  
**ALUMINIUM NANOPOWDER OXIDATION**  
**IN LIQUID WATER WHEN HEATING**

It is shown that aluminium nanopowder content in aqueous suspension influences its oxidation condition by liquid water. Aluminium oxidation process is stated to be characterized by following breakdown time and under certain conditions by aqueous suspension self-heating as well as heat and hydrogen eliminating after aqueous suspension heating to 64...66 °C. To obtain maximal oxidability level of aluminium nanopowder in the conditions of the given experiment it is necessary to adhere to the ratio (in mass parts)  $\text{H}_2\text{O}:\text{Al}=8:1...25:1$ .

UDC 669.1715:548:55:539.214.219

**Kuprekova E.I., Klimova K.V., Kireeva I.V.,**  
**Chumlyakov Yu.I., Chernov I.P.**  
**INFLUENCE OF HYDROGEN ON MECHANICAL PROPERTIES OF**  
**[012]-CRYSTALS OF AUSTENITIC STEEL Fe-18Cr-14Ni-2Mo**

The influence of hydrogen alloying on critical shearing strain, strain hardening coefficient and crystal plasticity depending on temperature of testing in the range of 77...400 K and hydrogen atom concentration has been investigated on monocrystals of austenitic stainless steel Fe-18Cr-14Ni-2Mo with low stacking fault energy. Hydrogenation up to 14 at. % is shown to result in 1,5...2 increase of strength

properties expressed by temperature dependence of critical shearing strains and to encourage development of local deformation by sliding.

UDC 544.032

**Borisova N.V., Surovoi E.P., Titov I.V.**  
**THERMAL TRANSFORMATIONS OF ALUMINIUM –**  
**ALUMINIUM OXIDE SYSTEMS IN NANOSIZE LAYERS**

Aluminium film of thickness more than 2 nm indicates, but less than 2 nm do not indicate characteristic absorption and reflection bands for aluminium in range  $\lambda=190...1100$  nm. By spectrophotometric, gravimetric and microscopic methods it is stated that thickness, mass and absorption, reflection spectrum of aluminium films ( $d=2...200$  nm) undergo considerable transformations as a result of heat treatment in an interval of temperatures 373...600 K during 1...140 minutes in atmospheric conditions. Kinetic curve of transformation degrees, change of thickness and weights of samples are shown to be satisfactorily described in the context of the logarithmic law. It is established that changes of absorption spectra, thickness and weights of aluminium films are connected with the formation of aluminium oxide on their surface.

UDC 543.226:541.123.7

**Trunin A.S., Makarov A.F., Yulina I.V., Zipayev D.V.**  
**PHYSICO-CHEMICAL STUDY OF THE SYSTEMS ON THE BASIS**  
**OF SODIUM AND AMMONIUM PERCHLORATE**

Interaction of anhydrous bicomponent systems  $\text{NaClO}_4$ - $\text{CO}(\text{NH}_2)_2$ ,  $\text{NH}_4\text{NO}_3$ ;  $\text{NH}_4\text{ClO}_4$ - $\text{NH}_4\text{NO}_3$  – ingredients of alternative fuels has been studied by the methods of visual-polythermal analysis and differential-scanning calorimetry.

UDC 543.253

**Stas I.E., Ivinina T.S.**  
**INVESTIGATION OF INFLUENCE OF ELECTROMAGNETIC**  
**FIELD ON ELECTROCHEMICAL BEHAVIOUR**  
**OF HEAVY METAL IONS IN THE PRESENCE OF BUTANOL**

By the method of inversion voltamperometry the action of high-frequency electromagnetic field of radio-frequency bandwidth on current of anode peak Zn(II), Cd(II) and Pb(II) in the presence of butanol, molecules of which are adsorbed on the electron surface decreasing its free surface has been studied. As a result of the field influence on electrode-electrolyte system removing of electrode processes inhibition is shown to take place, it is conditioned by desorption of adsorbate molecules from electron surface. Desorbing action of high-frequency current is proved by measuring degree of electrode filling with butanol molecules and Frumkin's adsorption equation parameters.

UDC 666.1.022.4:66.093.2

**Kazmina O.V., Abiyaka A.N., Moskalev Yu.A., Dits A.A.**  
**LUMINESCENT GLASSES FOR TRANSFORMATION**  
**OF X-RAY EMISSION IN RADIATION INTROSCOPES**

Compositions of luminescent glasses for transformers of X-ray emission in radiation introsopes have been developed. Investigation of x-ray-luminescence of inorganic glasses activated by rare-earth element ions at excitation by X-ray radiation is carried out. The technique of measuring luminosity of transformer X-ray luminescence by using equipment of radiation introsopes is tested.

UDC 666.1.01:66.1.031:66.046.52

**Krashenninnikova N.S., Kazmina O.V., Frolova I.V.**  
**BATCH PULPING ON THE BASIS OF NATURAL**  
**SUBSTANDARD SILICEOUS MATERIALS**

It is shown that using silica sand of Tugansk deposit (Tomsk region) and marshalite of Elbash deposit (Novosibirsk region) having more developed specific surface in comparison with silica sand of Tashlin deposit (Ulianovsk region) in combination with their grain defective structure provides an increase of batch chemical activity at the stage of silica- and glass-formation. The effective method of preparing glass batch using substandard fine-dispersed siliceous materials in glass production is their compaction.

UDC 543.42

**Petrova E.V., Astashkin A.P., Filonenko D.A.,  
Otmakhov V.I., Izaak T.I., Volokitin G.G.  
INVESTIGATION OF PERSPECTIVES IN USING  
HYDROPHOBIC FIBROUS SORBENTS  
FOR WATER PURIFICATION FROM HEAVY METALS**

Sorption capacity of hydrophobic fibrous sorbents to a number of metals in aqueous environment on the basis of polypropylene and polyethylene terephthalate obtained from thermoplastic polymer wastes has been studied. Using experimentally obtained data on dependence of metal extraction degree on fibre placing density, dispersity, presence of air in the system, volume of transmission solution the mechanism of their sorption from aqueous environment by hydrophobic fibrous materials is suggested.

UDC 628.16

**Vlasov A.V., Vergun A.P.  
APPLICATION OF SORPTION AND MEMBRANE METHODS IN  
THE PROCESS OF WATER PURIFICATION FROM DICLOFENAC**

The results of experimental investigation in water purification from pharmaceuticals by the example of diclofenac by means of activated carbon adsorption and using nanofilter membranes are presented. High efficiency of application of these processes in water purification is shown.

UDC 621.039.342+661.1+543.51

**Zaykov A.A., Zyryanov S.M., Kulinich Yu.A.,  
Pulnikov I.I., Skorynin G.M., Vlasov V.A.  
INVESTIGATION OF CONTAMINATION CAUSED BY RUBBER  
COMPACTOR IN ARSINE PURIFIED IN GAS CENTRIFUGE**

In the process of studying the application of gas centrifuges for deep purification of arsine from impurities sulphur was found. Estimation of quantitative content of sulphur in pure arsine showed the value  $\sim 10^{-4}$  wt. %. The sources of sulphur was stated to be rubber compactors forming gas centrifuge complex and made from rubber on the basis of butadiene-nitrile caoutchouc using sulfur cure. Using rubber compactors made from rubber produced from fluoroelelastomers, not undergoing to sulfur cure one can provide sulphur content in pure product less than  $10^{-5}$  wt. %.

UDC 622.648.24

**Solodov G.A., Zhbyr E.V., Papin A.V., Nevedrov A.V.  
TECHNIQUE OF COMPLEX SLIME WATER TREATMENT  
OF COAL-MINING BRANCH**

The possibility of complex slime water treatment at coal-mining and coal-treating plants producing marketable products: power-generating concentrate, coal-water fuel, magnetic fraction, industrial water is shown. A basic process flowsheet of slime water treatment presenting a united technological complex is suggested.

UDC 628.168.3

**Ushakov G.V., Solodov G.A., Mochalnikov S.V.  
DEVELOPMENT OF SALT DEPOSIT AND CORROSION  
RETARDANT IN AQUEOUS ENVIRONMENT ON THE BASIS  
OF ORGANIC PHOSPHONATE FOR THE WATER RECYCLING  
SYSTEMS OF CHEMICAL AND BY-PRODUCT COKING  
INDUSTRIAL ENTERPRISES**

The results of laboratory investigation showing that composition of organophosphorous complexon ОМЭД (salt of 1-oxyethylidene-diphosphonic acid with 2-dimethyl-amino-methylphenol) and zinc sulphate is an efficient retardant of corrosion and salt deposit in aqueous environment are presented. Therefore it can be applied in the recycling cooling systems of industrial enterprises.

UDC 662.749.33

**Lozbin V.I., Mochalnikov S.V., Solodov G.A.,  
Papin A.V., Nevedrov A.V.  
HIGH-BOILING COMPONENTS IN STRAW OIL**

Investigation of straw oil and polymer quality produced in the process of its regeneration has been carried out. The conclusions about us-

ing polymers as a material for base end products are made. Flow scheme of technological treatment of straw oil wastes is suggested.

UDC 547.461.6; 547.327

**Yanovskiy V.A., Baturin D.M., Yagovkin A.Yu., Bakibayev A.A.  
REACTIONS OF DIPHENIC ACID WITH CARBAMIDE AS A  
WAY TO ACYCLIC AND CYCLIC AMIDES OF DIPHENIC ACID**

On the basis of reaction of diphenic acid with carbamide in the conditions of azeotropic water distillation a new way of producing acyclic and cyclic amides of diphenic acid has been found. The nature of aminating agent is shown to determine composition of reaction products: at aminating diphenic acid not substituted by carbamide the basic product is imide, whereas at aminating by substituted carbamide and amines it is corresponding monoamide. On the basis of experimental data the mechanism of the reactions is suggested.

UDC 541.128;547.239.2;547.292

**Sidorova O.I., Galanov S.I., Filimonov V.D.  
PROCESS OF CATALYTIC SYNTHESIS OF ACETONITRILE  
FROM ACETIC ACID AND AMMONIA AT  $\gamma\text{-Al}_2\text{O}_3$**

In the reaction of catalytic synthesis of acetonitrile from acetic acid and ammonia the influence of ratio of reagents, reactor temperature, addition of acetic acid, acetic anhydride and acetamide into the reaction mixture of ethylic ether as well as catalyst promotion ( $\gamma\text{-Al}_2\text{O}_3$ ) by phosphoric acid on the parameters of the process. Optimal conditions of the reaction are determined and the scheme of commercial prototype process is suggested.

UDC 547.539.04

**Chaykovskiy V.K., Funk A.A., Kozlova N.S., Kets T.S.  
INTERACTION OF SUBSTITUTED  
ARIL IODIDE WITH PROTONIC ACID**

Using the program GAUSSIAN'98W calculation of Gibbs free energy, activation enthalpy and free activation energy of direct and reverse interaction reaction of substituted aryl iodide with mineral acids has been carried out. Experimental test of the obtained theoretical results is performed. HI is shown to demonstrate a strong deiodising effect only on the compounds with high  $\pi$ -electron density. HCl,  $\text{H}_3\text{PO}_4$  and  $\text{H}_2\text{SO}_4$  are partially deiodized by only 4-iodaniline.

UDC 532.547+621.928.93

**Aslamova V.S., Aslamov A.A., Museva T.N.  
CHARACTER OF DUST PARTICLE MOTION IN COCURRENT  
CYCLONE WITH INTERMEDIATE DUST EXTRACTION**

The problem of dust particle motion in cocurrent cyclone with intermediate extraction under the influence of centrifugal and aerodynamic force of gas flow resistance has been solved. Dust particle motion path of different diameters at different points of cyclone input as well as calculation formulas of minimal particle diameter captured by intermediate and basic dust extraction are obtained. Theoretical efficiency of intermediate extraction separation and cyclone in general that are compared with experimental values is calculated. Evaluation of fractional efficiency parameters according to НИИОГАЗ technique is performed.

UDC 621.928.9

**Shilayev A.M., Rekunov V.S.  
METHOD OF DEFINING DISPERSED COMPOSITION  
OF POWDER MATERIAL BY UNIFLOW CYCLONE STAGE**

At powdered burning of fine-dispersed solid fuel the behaviour of particles of different size in dust- and ash extraction devices are not the same. To make a justified choice and correct estimation of gas purification system operation the data about dispersed composition of the extracted product are necessary. The technique allowing operative calculation of fractional composition has been developed. The obtained results and the data of dispersed analysis obtained other method are compared. Stable solution showing the possibility of using the method in defining dust dispersity from 10 to 50 mkm is obtained.

UDC 661.181.12:662.73/.74.001.5

**Gil A.V., Zavorin A.S., Krasilnikov S.V.,  
Obukhov S.V., Starchenko A.V.**

**INVESTIGATION OF AERODYNAMICS AND BURNING IN BOILER FURNACE БК3-420-140 AS APPLIED TO REPLACEMENT VARIANTS OF PROJECT FUEL**

The results of studying accurate processes in boiler furnace БК3-420-140 of Omsk heat power plant-4 at burning project fuel in it (Ekibastuz coal) and substituting coals (Kuznetsk D and Irsha-Borodinsk coals) on the basis of mathematical models of applied program package FIRE 3D are presented. The analysis of the results obtained in three-dimension interpretation applicable to each fuel type as well as comparison of the obtained data with standard calculations is made.

UDC 532.54:518.12:532.135

**Kozlobrodov A.N.**

**FILM SINTERING OF NONLINEAR VISCOELASTIC LIQUID ON LATERAL SURFACE OF CIRCULAR CYLINDER**

On the basis of V.N. Pokrovskiy's rheological model describing behaviour of filled polymer system the problem of film sintering of nonlinear viscoelastic liquid on lateral surface of vertical cylinder is considered. Mathematical problem statement, methods of its solution is presented, calculation results are discussed, factors influencing the film sintering process are analysed.

UDC 661.879+621.365+621.314

**Brendakov V.N., Dementiev Yu.N., Kladiev S.N., Pishchulin V.P.**  
**SYSTEM OF CONTROLLING TEMPERATURE CONDITIONS BY DRUM-TYPE ROTARY FURNACE IN OBTAINING URANIUM OXIDES**

Application of symistor control stations for current throttling through heating chamber elements of drum-type rotary furnace in obtaining uranium oxides is suggested. Functional scheme of automatic control system by electric heating elements is presented. By means of it one can control furnace temperature conditions optimally. Imitation model and some results of investigation are given.

UDC 621.365.5

**Zeman S.K., Sandyrev O.E.**

**PULSE-CODE TECHNIQUE OF CONTROLLING PROCESS VARIABLE OF FREQUENCY CONVERTER IN INDUCTION HEATING DEVICE**

The technique of pulse-code control of frequency converter process variable to install induction heating is suggested. The basic analytical relationships for calculation of control characteristics of the technique suggested at constant resistance of converter load are presented. Using the given method both loss power at switching power interconnecting device and mass-size parameters are shown to decrease significantly, whereas frequency converter efficiency increases.

UDC 621.365.5

**Zeman S.K., Osipov A.V., Sakharov M.S.**

**INVESTIGATION OF DEPENDENCIES OF RESONANCE CIRCUIT CHARACTERISTICS ON DESIGN AND ELECTRIC VALUE OF "INDUCTOR – HEATED OBJECT" SYSTEM**

The research of impedance characteristics of series resonance load circuit in the system of induction heating has been carried out. The border determination algorithm of resonance frequency change and tuned-circuit Q-factor at changing temperature of heating object, gap size between the inductor and the object, the number of windings and inductor current, nominal frequency is suggested.

UDC 621.382.323

**Tuyev V.I.**

**DESIGN OF NONLINEAR DISTORTIONS IN FET PASSIVE ATTENUATOR**

The FET passive attenuator nonlinear transfer function design method is suggested. Method permits to compute regulation curve

and nonlinear distortion passive attenuator on JFETs, MOSFETs and GaAs MESFET. Results of researching attenuators with parallel, series and combined connection of varied elements are presented.

UDC 004.032.26:612.825

**Tereshkov A.M.**

**HOMOGENEOUS MULTILAYER NEURON NETWORK OF DIRECT PROPAGATION WITH LOCAL CONNECTIONS WITH CONDITIONED LEARNING MECHANISM ON THE BASIS OF WINDOW EQUILIBRIUM NEURON-LIKE ELEMENTS**

A classical model of artificial neuron has been considered. Window equilibrium neuron model is suggested to use in multilayer neuron network of direct propagation. Conditioned learning mechanism is described.

UDC 681.5.343.9

**Polyakov V.V., Slobodyan S.M.**

**ANALYSIS OF HIGH-TECH METHODS OF ILLEGAL REMOTE COMPUTER DATA ACCESS**

The analysis of high-tech methods of committing crimes in the sphere of computer information has been performed. The crimes were practically committed from remote computers. Virtual traces left at realisation of such methods are revealed. Specific proposals in investigation and prevention of the given type computer entry are developed.

UDC 004.891

**Dragun I.A., Ustinov G.G., Zatsepin P.M.**

**AUTOMATION SYSTEM OF QUANTITATIVE ESTIMATION OF OPERATIVE RISK**

Automation system of quantitative analysis of operative risk which is an expert object-module support system in making clinical decisions by means of analysis by neuro-network and probability-statistic methods of medical-biological data and obtaining knowledge from empirical information has been developed and applied.

UDC 330.3+332.012

**Marakhovskiy A.S., Toroptsev E.L.**

**LEADING ECONOMICAL MACROSYSTEMS TO THE MAIN TRACK OF DEVELOPMENT**

The problem of leading an arbitrary macroeconomical system to the main track of development along the path which approximates proportions of gross domestic product to the optimal proportions from the point of view of some quadratic quality criterion is considered. In this case optimal proportions of gross domestic product are considered to be proportions of main (standard) economical system.

UDC 339.13.012.42

**Gershanovich E.A.**

**CURRENCY LIBERALIZATION: FOR AND AGAINST**

The notion of currency convertibility is considered; the author's definition of total convertibility is suggested. The prerequisites for cancellation and factor of conservation of capital movement limitations, advantages and disadvantages of total rouble convertibility are analysed. The conclusion that currency liberalization does not mean arrangement of real rouble convertibility is made. Specific measures providing real Russian currency convertibility are proposed.

UDC 628.97:628.946.003

**Nikitin V.D., Matushchenko A.A., Shalamova Yu.S.**

**ECONOMICAL ANALYSIS OF EXTERIOR LIGHTING INSTALLATIONS**

Technical-economical comparison of searchlight and street lighting installation with different sources of light has been made. It is shown that it is better to use cost of light energy unit for estimation of lighting economical parameters. Its values for a number of sources are calculated. For a searchlight metal-halide lamps provide minimal cost, whereas for street lighting sodium lamps do. The technique of calculating reduced cost on the basis of cost of light energy unit is suggested.

UDC 305:947.083

**Kiselnikova T.V.**  
**TRANSFORMATIONS OF CIVIL SOCIETY MODEL**  
**IN THE CONDITIONS OF NEOLIBERAL GLOBALIZATION**

In the conditions of neoliberal globalization transformation of civil society model presented by the views of German political philosopher J. Habermas and his British opponent A. Callinicos has been considered.

UDC 008:303.2

**Lukianova N.A.**  
**POST-NON-CLASSICAL METHODOLOGY**  
**OF AIM AND DREAM INVESTIGATION**

The possibility of method agreement of modern philosophic direction by means of post-non-classical methodology in the research of such human existence phenomena as aim and dream is shown. The thesis that post-non-classical methodology and that of information process investigation in particular is a theoretical-methodological foundation for the research of human consciousness phenomena data is argued.

UDC 930.2

**Chekhovskikh K.A.**  
**CREATION OF ZEMSK EDUCATIONAL SYSTEM**  
**IN THE WESTERN SIBERIA IN SUMMER 1917 – SPRING 1918**

Short history of creation and development of popular education in the Western Siberia during "the first Zemsk period in autumn 1917 - spring 1918" is presented. The problem was stated to define the place and the role of education sphere in the system of Zemsk self-government as well as the approaches and methods of new Siberian Zemstvos in creation of school network, self-government systems and educational financing.

UDC 9 (C18)

**Eremin I.A.**  
**ARMY PRISONERS OF THE FIRST WORLD WAR**  
**IN THE WESTERN SIBERIA**

Different aspects of location of several thousand army-prisoners of Austria-Germany block on the territory of the Western Siberia during the First World War are shown.

UDC 94(574Б)

**Nurbayev K.Zh.**  
**ON SOME PECULIARITIES OF KAZAKH-RUSSIAN**  
**RELATIONS: INCREASE OF RUSSIAN POLITICAL INFLUENCE**  
**IN AVERAGE ZHUZ AT THE END**  
**OF THE XVIII – FIRST QUARTER OF THE XIX CENTURIES**

The peculiarities of the Russian-Kazakh relations at the end of the XVIII - the first quarter of the XIX centuries are revealed. Analysing the sources of information the author makes a conclusion about the fact that during this period a gradual consolidation of the political influence of Russia in the average Zhuz took place.

UDC 378.141.21

**Permyakov O.E., Ilukhin B.V.**  
**PROBLEMS OF PROVIDING THE ENTRY QUALITY**  
**AND IMPROVEMENT DIRECTIONS OF COMPETITIVE SYSTEM**  
**OF THE RUSSIAN FEDERATION HIGHER SCHOOLS**

The main problems and the reasons for providing the entry quality of entrants of the state higher schools in the Russian Federation have been defined. It is shown that the entry just by the results of learning

achievements does not provide the enrolment of the most able citizens ready for learning according to the educational programs. To solve this problem it is suggested to use the assessment results of entrants' professional orientation and personal qualities at the enrolment. They show the successfulness of entrants' socializing both in institute and in their future profession.

UDC 378.14(571.16)

**Permyakov O.E.**  
**METHODOLOGICAL APPROACHES TO MODELLING**  
**A SPECIALIST'S PERSONAL-PROFESSIONAL COMPETENCE**  
**IN THE COURSE OF FORMING STATE EDUCATIONAL**  
**STANDARDS OF NEW GENERATION**

On the basis of theoretical-information analysis the methodological approaches to modelling specialist's personal-professional competence as a system consisting of subsystems, namely, personal competences. The competences are shown to present systems consisting of corresponding competences, decomposition of which can be made by means of description of systematic-activity models of personal and professional competences in the context of human cognitive, communicative and creative activities.

UDC 546:378.26(076)

**Minin M.G., Stas N.F., Zhidkova H.V., Rodkevich O.B.**  
**STATISTIC ANALYSIS OF TEST QUALITY USED**  
**TO CONTROL CHEMISTRY**

By means of mathematical tool of test classical theory the analysis of chemistry examination results has been made. Statistic parameters of the first and the second latter examinations are calculated. Approximation of frequency distribution of the test points to the standard distribution of statistic data is shown. The reliability of the tests is shown to be in the admissible value range, but it is necessary to increase their content validity.

UDC 373.880

**Lelushkina K.S.**  
**INTERACTIVE NATURE OF TEACHING FOREIGN**  
**PERSONAL-ORIENTED COMMUNICATION**

Forming skills in oral-speech personal-oriented communication the interactive teaching nature is brought to the forefront. In the paper the revision of teacher's and students' status is presented. The author considers the field of students' action which extends due to appearance of new pedagogical functions as well as norms of verbal and non-verbal behaviour of students in group.

UDC 681.3:378

**Akhremchik O.L.**  
**FUNDAMENTALS OF MODEL CONTRACTION DESIGN**  
**TECHNOLOGY FOR DISTANCE LEARNING**

The basic technology constituents of constructing the models of problem region directed to creative level of material presentation and learning when using the methods and means of distance learning by the example of technological process control system design are presented. Descriptions of design objects and basic model constituents are distinguished. As a conceptual bases the concept of knowledge extraction, structuralization and formalization are proposed. Technological consequence of design model construction is considered. The questions and problems for experts' at knowledge extraction are formulated. As a knowledge fragment invariant for training complex in design distance learning the time limits for presentation and learning hierarchical system presentation from the position of general system, structural presentation of the system studied, detailed elaboration of the description in the problem region methodology are suggested.